

RADIO AND SONIC TRACKING OF JUVENILE SEA TURTLES IN INSHORE WATERS OF LOUISIANA AND TEXAS

Sharon A. Manzella

Jo A. Williams

Charles W. Caillouet, Jr.

National Marine Fisheries Service, Galveston Laboratory, 4700 Avenue U, Galveston, TX 77551-5997 USA

INTRODUCTION

Two separate inshore tracking studies were completed between September 1988 and September 1989. The first (study 1) in Lake Calcasieu, Louisiana, involved a 1985 year-class head started Kemp's ridley (*Lepidochelys kempi*) sea turtle (SCL=40.2 cm) that was originally released in May 1986 and was caught in a gill net in the West Cove area of Lake Calcasieu in April 1988. The turtle was re-released with radio and sonic transmitters in September 1988 and tracked for 24 days (23 Sept. - 16 Oct.). The second tracking study (study 2) involved a wild green (*Chelonia mydas*) sea turtle (SCL = 35.4 cm) that was found cold stunned in the southern Laguna Madre near Port Isabel, Texas in February 1989. The turtle was released with radio and sonic transmitters in August 1989 and tracked for 26 days (24 Aug. - 18 Sept.).

MATERIALS AND METHODS

Study 1 was located in southwestern Louisiana, about nine miles to the north of Cameron. It is an estuarine environment (salinity ranged 5-19 ppt with a mean of 12 ppt) that supports both a small crab and shrimp fishery and some oystering. Both West Cove and Lake Calcasieu are shallow, less than 1.5 m and 2.1 m respectively, in most areas. The Intracoastal Waterway (ICWW) runs north to south and separates West Cove from Lake Calcasieu. Study 2 was conducted in the southern area of the Laguna Madre near Port Isabel and South Padre Island, Texas. This area is very shallow, less than 1.2 m in most areas, with a hard sand bottom that supports typical sea grass beds. Salinity ranged 29-34 ppt with a mean of 30.7 ppt. There is no commercial fishing, but it does support a major sport fishery for speckled trout and red drum. The ICWW, which runs north to south, bisects this southern section of Laguna Madre and is the deepest area around with a water depth of about 3.6 m.

In study 1 the turtle was tracked and monitored for 24 hours for the first three days after release and about 10-11 hours a day, weather permitting, for the remainder of the study. Most data were collected in daytime with some nighttime observations. If tracking by boat was not possible, we monitored radio signals from the turtle by vehicle. In study 2, sampling was the same except the turtle was monitored for 24 hours on days 1 and 3 after release.

For both studies, data collected included turtle movement, "surface" and submerged times, air and water temperature, and salinity. "Surface" times are defined as at or near the surface. In both cases the radio transmitter antenna would transmit once it broke the surface, which would occur even if the turtle was submerged slightly below the surface. Visual observations were made that verify this.

The type of tracking antenna and the attachment method of the radio transmitters were different for each study. In study 1, a hand-held, directional two-element "H" antenna was used, and in study 2, a boat-mounted, directional five-element "Yagi" antenna. The "Yagi" antenna receives a narrower signal pattern, which made locating the turtle much easier. The radio transmitter in study 1 was attached to a post central scute with a tether and floated behind the animal. In study 2, the transmitter was cemented to the second neural scute with dental acrylic, and then secured with fiberglass cloth and resin. In both studies sonic transmitters were attached to the posterior marginal scutes with nuts and bolts.

RESULTS AND DISCUSSION

Study 1, West Cove / Lake Calcasieu, was our first attempt at this type of work, and we encountered some problems. The turtle was seen only four times after being released. We concluded the lack of sightings was due to inexperience on our part with the radio tracking gear and that the 2-element "H" antenna was not the best type of antenna available. When good signals were achieved, it was still quite difficult to get close enough to the turtle to hear the sonic transmitter and then to get a visual observation. The range of the sonic transmitter was about 92 m, and we believe the range was greatly reduced, mostly due to the bottom substrate, which was a soft, mucky mud. We feel this bottom type absorbs the sound waves.

The turtle spent most of the time underwater, as one might expect, as seen when comparing mean surface and submerged times by hour of day for the 24 days combined (Figure 1). The mean surface times were consistently short throughout the 24-hour day. The mean submerged times varied widely, with slightly longer submerged times occurring during the early to mid morning hours.

Figure 2 shows the release site and the four other sightings that were made throughout the study. "R" is the area of release on 23 September 1988. The turtle stayed in this general area for the first two days. The second sighting occurred on 25 September and was at location "2". The third contact "3" was on 1 October, but was only sonic contact. Tracking had to be terminated due to approaching thunderstorms before a visual observation could be made. A visual observation was made the following day at site "4". We observed the turtle in a behavior that seemed to be "working a line of crab pots." (By this we mean the turtle was possibly feeding on crabs.) The turtle would surface at one trap float and then 10-15 minutes later it would surface at the next one that was set about 18 m away. This behavior was observed for a little over an hour. The turtle was not seen again until 16 October at site "5" in Lake Calcasieu. At this time the transmitter looked like it was entangled with grass. The following night while monitoring the radio signal by vehicle, a constant signal was received. On 18 October the transmitter was found floating free, a little further north in Lake Calcasieu. The transmitter was overgrown with hydrozoans, and the added weight almost certainly caused the transmitter to fall off. This terminated the study.

For study 2, southern Laguna Madre, mean surface and submerged times by hour of day for all 26 days combined are shown in Figure 3. There is a sharp difference in the amount of time the turtle spends submerged, depending upon the time of day. This change in length of time submerged corresponds to dawn and dusk. Surface times also increase slightly during the nighttime hours when the turtle is most likely resting. The short amount of time spent both on the surface and submerged during daylight hours is probably due to periods of high activity.

During this study the turtle was tracked and monitored for 26 days, including 17 days on the water. Visual observations were made on 11 days (Figure 4); on two days only sonic contact was made, and on six days signal triangulations were calculated but with no visual or sonic contact. Triangulations were taken when problems were encountered in receiving the sonic signal through heavy vegetation and very shallow water. The sonic range diminished from .8 km to 1.5 m. After being released and initially crossing the ICWW, the turtle's movement was scattered on the eastern side of the ICWW. The turtle was not seen to the west of the ICWW for the remainder of the study. This was most likely due to the fact that no sea grasses have been reported to the west of the ICWW (pers. comm., Millicent Quammen, USFWS, Corpus Christi, TX, 1989). The turtle was detected by sonic on day 26 of the study near the Brazos Santiago Pass and in the direction of the Gulf of Mexico. The following day, no radio signal could be heard and the turtle could not be located. The area was searched for several days, but no signals were heard and the study was terminated. We believed the turtle went into the Gulf of Mexico.

Apparently the turtle left the Laguna Madre shortly after the passage of two minor cold fronts that caused air temperatures to drop an average of 6°C after each passage, with intervening warming between the two fronts up to 30°C. Water temperatures dropped from 30°C to 26-27°C. Even though these temperatures are far from "cold stunning" levels, it may have triggered the turtle to leave the area. Another possibility is that the turtle may have drifted with the current in the ICWW toward the Gulf. The turtle was seen in the ICWW for the first time since release, the day before being heard near the Brazos Santiago Pass.

ACKNOWLEDGMENTS

Thanks go to the USFWS personnel of the Sabine National Wildlife Refuge in Louisiana and the Laguna Atascosa National Wildlife Refuge in south Texas, and to Don Hockaday of the Pan American University's Coastal Studies Lab in South Padre Island, Texas for all the help given to us while working away from our home base in Galveston. Also a special thanks to Richard Byles (USFWS, Albuquerque) for answering the many questions we had about radio tracking and to NMFS personnel who assisted us in these studies.

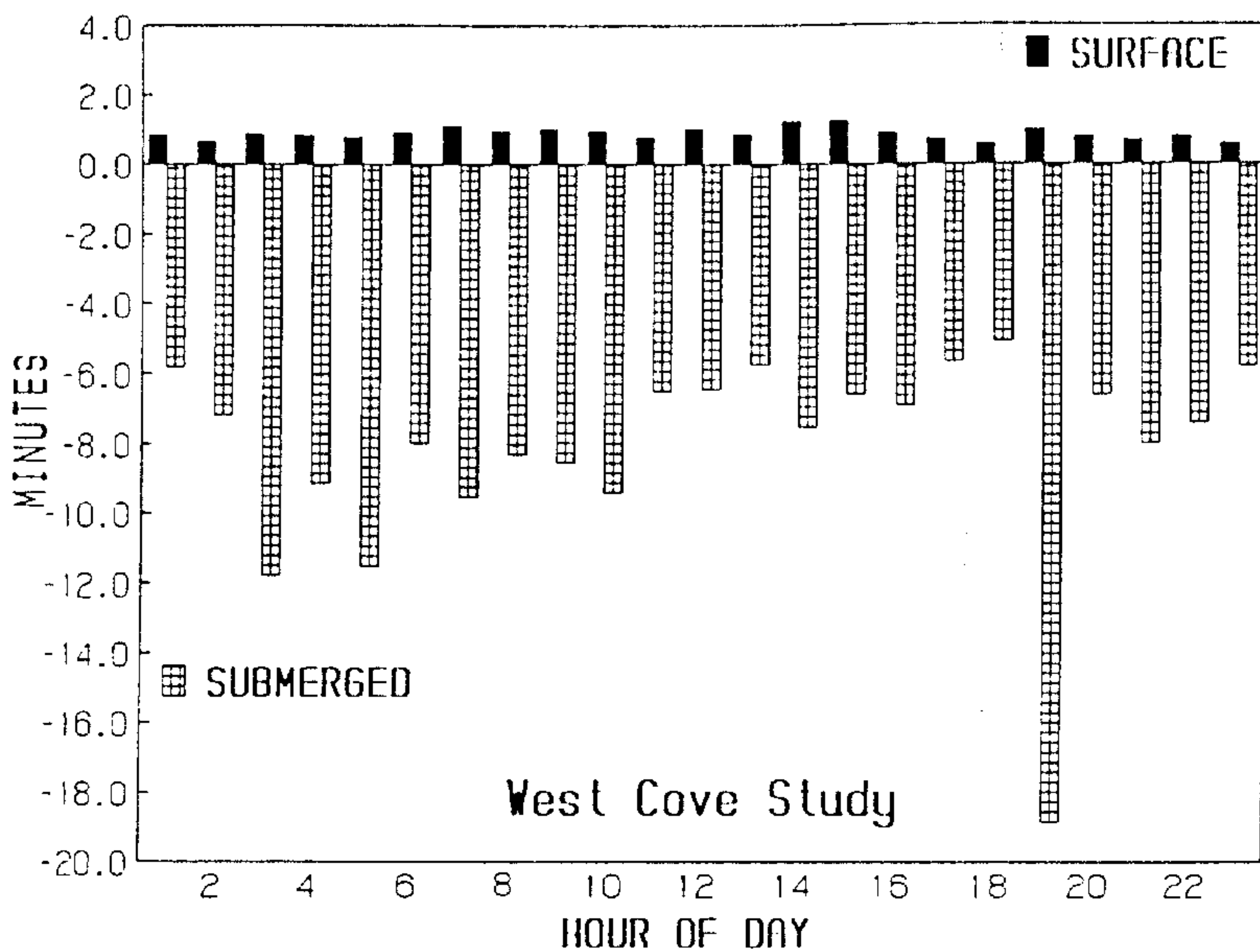


Figure 1. Mean surface and submerged times by hour of day for all 26 days combined.

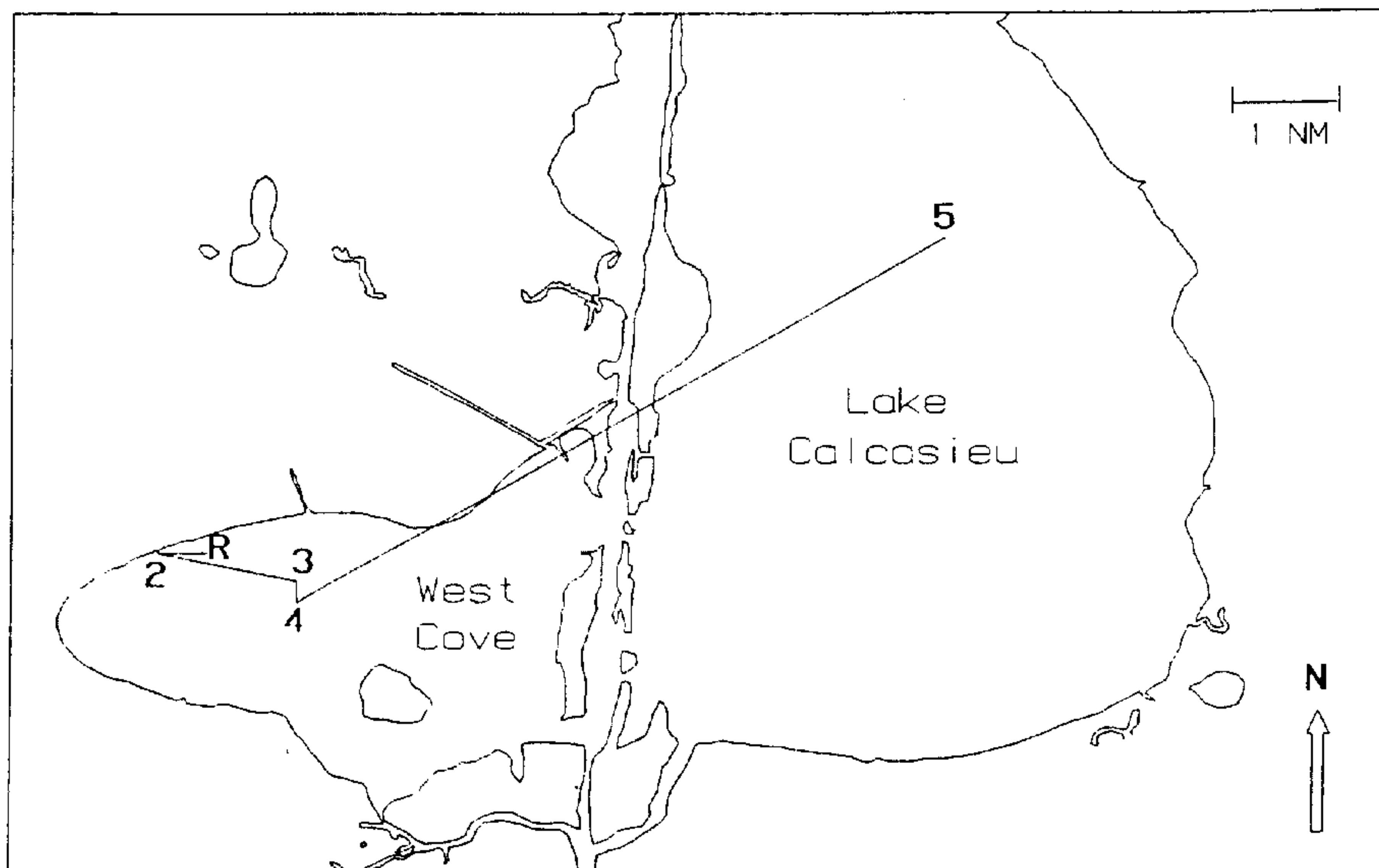


Figure 2. Locations of Head started Kemp's ridley sea turtle from 23 September - 16 October 1988. (R=release site.)

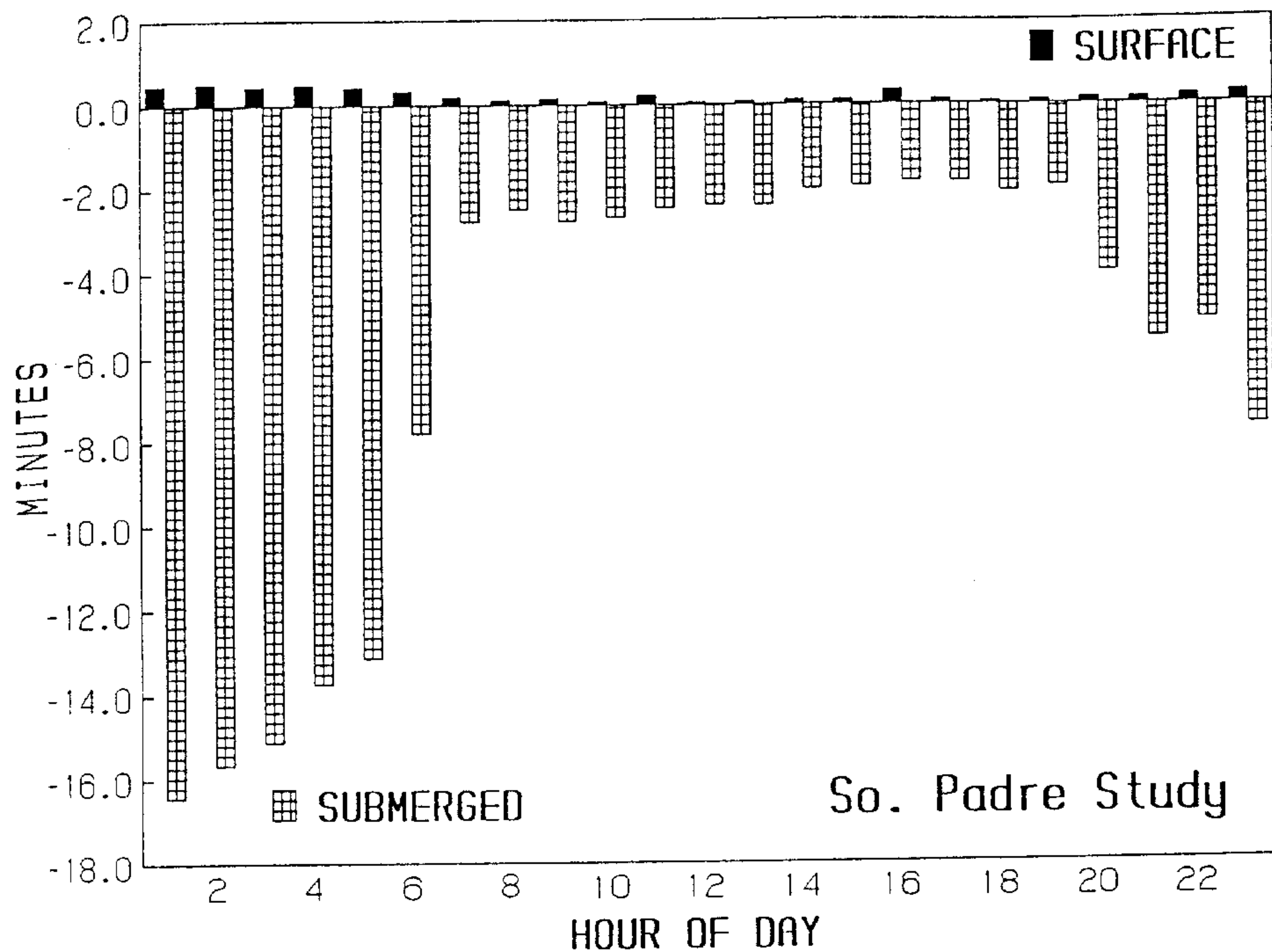


Figure 3. Mean surface and submerged times by hour of day for all 26 days combined.

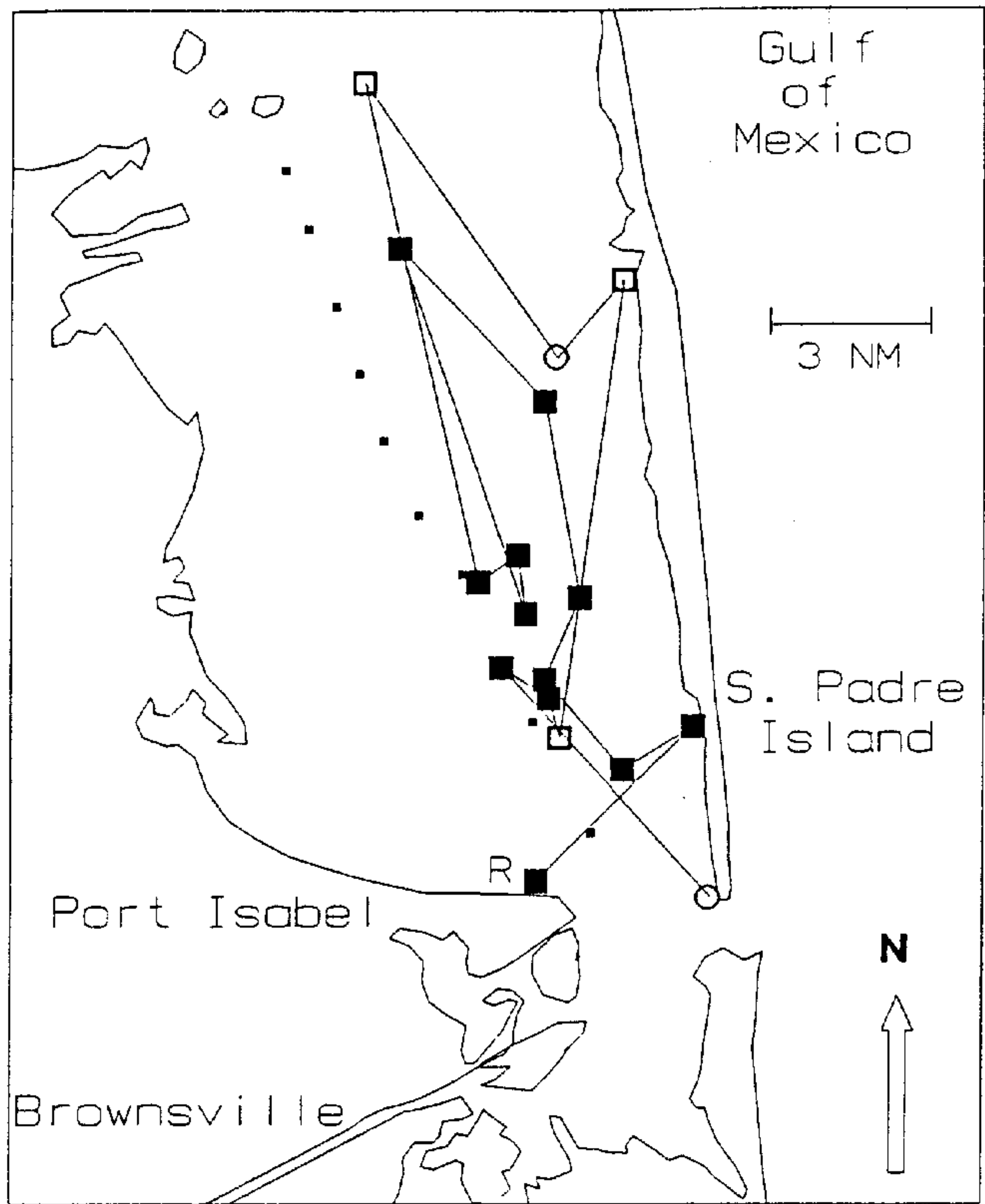


Figure 4. Locations of wild juvenile green sea turtle from 24 August - 18 September 1989. (Small solid squares=ICWW; R=release site; Large solid squares=visual observations; Open circles=sonic contact only; Large open squares=triangulated positions.)